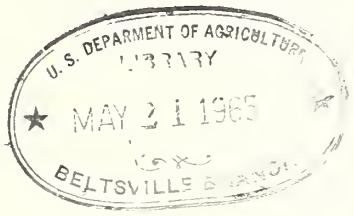
MARKETING RESEARCH
REPORT No. 604

Relations of.....

WEIGHTS and SIZES of BROILER PARTS to CARCASS WEIGHTS



U.S. DEPARTMENT OF AGRICULTURE

Agricultural Marketing Service

Transportation and Facilities Research Division

in cooperation with

UNIVERSITY OF GEORGIA ◆ College of Agriculture Experiment Stations

PREFACE

The information in this report is based on research conducted jointly by the Agricultural Marketing Service, U. S. Department of Agriculture, and the University of Georgia, College of Agriculture Experiment Stations. The research reported herein is part of a larger project dealing with more efficient work methods, equipment, and facilities for cutting up poultry. This study was undertaken to develop background information to be used in the development of methods and equipment for weighing poultry parts.

This work was conducted under the supervision of John A. Hamann, marketing research analyst, Transportation and Facilities Research Division, Agricultural Marketing Service, and Harold D. White, agricultural engineer, College Experiment Station of the University of Georgia, College of Agriculture Experiment Stations, Athens, Ga.

CONTENTS

Washington, D. C.

June 1963

RELATIONS OF WEIGHTS AND SIZES OF BROILER PARTS TO CARCASS WEIGHTS

By Roger E. Walters, K. N. May, and P. D. Rodgers 1/

SUMMARY

The relationships between chicken carcass weight and the weight, volume, and dimensions of its component parts become more important as larger quantities of poultry meat are sold in cut-up form. Accurate information regarding these relationships is necessary for efficient cut-up and packaging operations and for the development of improved methods and equipment for that work.

In the study reported here, a large number of broilers were cut up, and the weights, volumes, and dimensions of the parts measured. These values were found to be directly related to carcass weights.

Weight, volume, and dimensions of broiler parts can be predicted with reasonable accuracy if the carcass weight is known. Sizing of carcasses can be used as a basis for providing uniform parts for portion-control packages (each package containing parts of the same size), and for convenient selection of parts to make up packages of an exact weight.

The percentage relationship of weights of parts to the carcass weight was found to be approximately the same for all weight groups.

BACKGROUND

As larger quantities of broiler meat leave the processing plant in exact-weighed packages of parts or as portion-controlled packages, problems in weighing, selecting, and grouping of individual parts require more attention. Packages of chicken for the institutional trade, for frozen dinners, and for packages weighed to predetermined limits require careful control of the weight of each part going into each package.

A knowledge of the weights, weight variations, volumes, and dimensions of parts from the various sizes of birds is necessary for the processor if he is to make effective use of his labor, freezing equipment, and frozen storage

---

1/ Mr. Walters is an agricultural engineer in the Transportation and Facilities Research Division, Agricultural Marketing Service. Dr. May is associate poultry husbandman, Poultry Department, College Experiment Station, University of Georgia, and cooperative agent, Market Quality Research Division, Agricultural Marketing Service. Mr. Rodgers is an agricultural engineer, Agricultural Engineering Department, College Experiment Station, University of Georgia.

space, and is to control carefully the net weights of packages. This information is needed in determining the end product to be made from various sizes of birds, the sizes of packages required for various parts, and sizes of chicken that provide convenient combinations of parts for exact-weight packages. It is needed also in controlling portion size by careful presizing of birds.

Understanding of these size characteristics of the parts of the broiler carcass is necessary if new equipment and techniques for weighing, grouping, conveying, and packaging are to be developed. The study reported herein was undertaken primarily to obtain background information for use in developing equipment and methods for packaging exact weights of poultry parts. After these data were compiled, it was evident that this information would be useful both to plant operators and to people in equipment development work.

This study was a part of a larger research project dealing with the development of improved work methods and equipment for cutting up and packing poultry.

PROCEDURE

Whole carcasses of broiler chickens were obtained from a Georgia processor immediately after the carcasses had been processed and prepared for shipment as icepacked broilers.

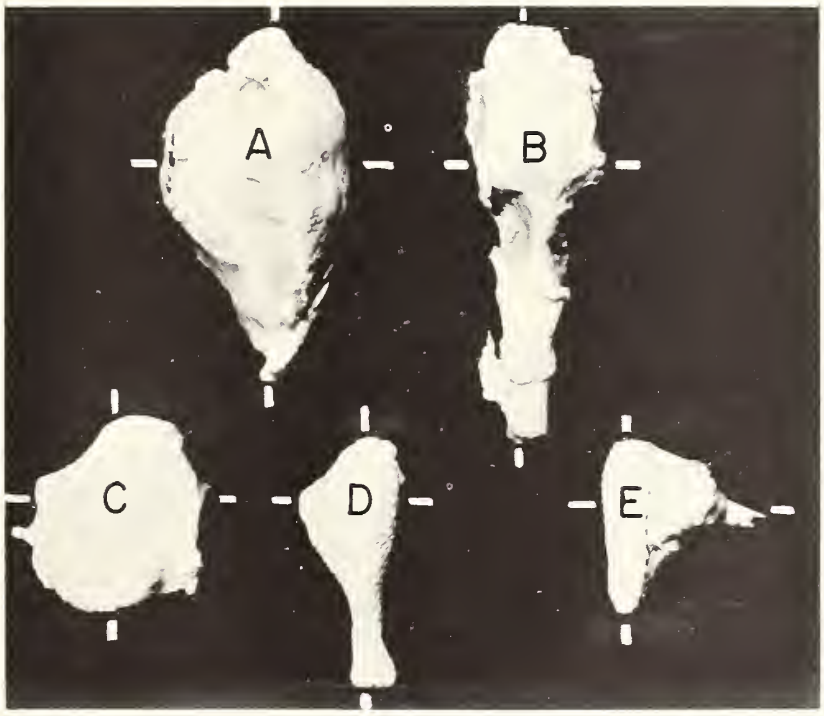
Upon receipt at the laboratory, the carcasses were removed as needed from the icepack container, the giblets and the neck were removed from each body cavity, loose ice was removed, and free water was allowed to drain from the carcass for about 1 minute. Each carcass was weighed. The weights ranged from 20 to 48 ounces. The carcasses were grouped into sizes differing in weight by 4 ounces; i.e., 20-24, 24-28, etc. The carcasses were then cut into the following parts: Wings, whole breasts with ribs and scapula, drumsticks, thighs, and stripped backs (fig. 1). Cuts were made according to standard practice, as much meat as possible being left on the more expensive parts. A detailed anatomical description of how these cuts were made is presented in the appendix (p. 26). Each part was weighed to the nearest gram, and was identified as coming from a particular carcass, so that parts could be related to the bird from which they came. This procedure was followed on 216 carcasses.

Three linear measurements were made on each part from 93 carcasses, and the measurements were identified with the carcass from which the parts had been removed. Each part dimension was measured to the nearest one-eighth inch, and the dimensions identified were length, width, and thickness. The length was the longest dimension of each part and the width the second greatest dimension. The length of each part was measured along the vertical axis (fig. 2), and the width was the longest horizontal measurement. Thickness was the greatest distance which the part extended above the surface on which it rested. A detailed description of these measurements is presented in the appendix (p. 26).

Volumes were determined for each part from 53 carcasses. Volume was measured to the nearest cubic centimeter by placing each part in a graduated cylinder which had been partially filled with water, and determining the change in the level of the water when the part was completely submerged.

BN-18235

Figure 1.--The component parts of a single broiler carcass: (1) Wings, (2) breast, (3) thighs, (4) drumsticks, (5) stripped back.



BN-18234

Figure 2.--Points between which dimensions were measured on: (A) Breast, (B) back, (C) thigh, (D) drumstick, (E) wing.

Data obtained from the series of weights, volumes, and dimensions were placed on data cards and analyzed by the University of Georgia Experimental Statistics Laboratory. A simplified report of these results is presented in the following sections; the detailed statistical analyses are presented in the appendix (p. 26). The analyses consisted of simple regression of total carcass weight as it was related to each of the variables.

RELATIONSHIP OF WEIGHTS OF PARTS TO CARCASS WEIGHT 2/

Statistical analysis of the weights of the parts and their relationships to the carcass weight indicated that for wings, drumsticks, thighs, breast, and backs, there was a definite relationship between the weight of the part and the weight of the carcass. A straight line best describes the increase in average part weight for a particular increase in carcass weight. Figures 3, 4, 5, 6, and 7 show each of the relationships of parts weights to body weight. On these figures, the center or heavy line represents the average relationship between part and carcass weight. The two lines parallel to and nearest the center line indicate the part weight range into which about 68.3 percent of the parts fell. The two intermediate lines parallel to the center line indicate the weight range into which 95.5 percent of the parts fell. The two outer lines represent the weight range into which 99.7 percent of the parts fell. From these figures, it can be noted that a minimum variation in part weight, for any given carcass weight, was found to exist for wings. Increasing amounts of weight variation, or a larger weight range, were found for drumsticks, thighs, backs, and breasts, respectively. Because the vertical scales are not the same for each graph, comparisons of variations cannot be made by visually comparing the charts. The statistical analysis on which these figures were based is presented in the appendix (table 3, p. 28).

The data given can be used as a guide in determining carcass weight required to provide a broiler part of a particular weight, the range of parts weights coming from given weights of birds, and the average weight of parts coming from a specific carcass weight.

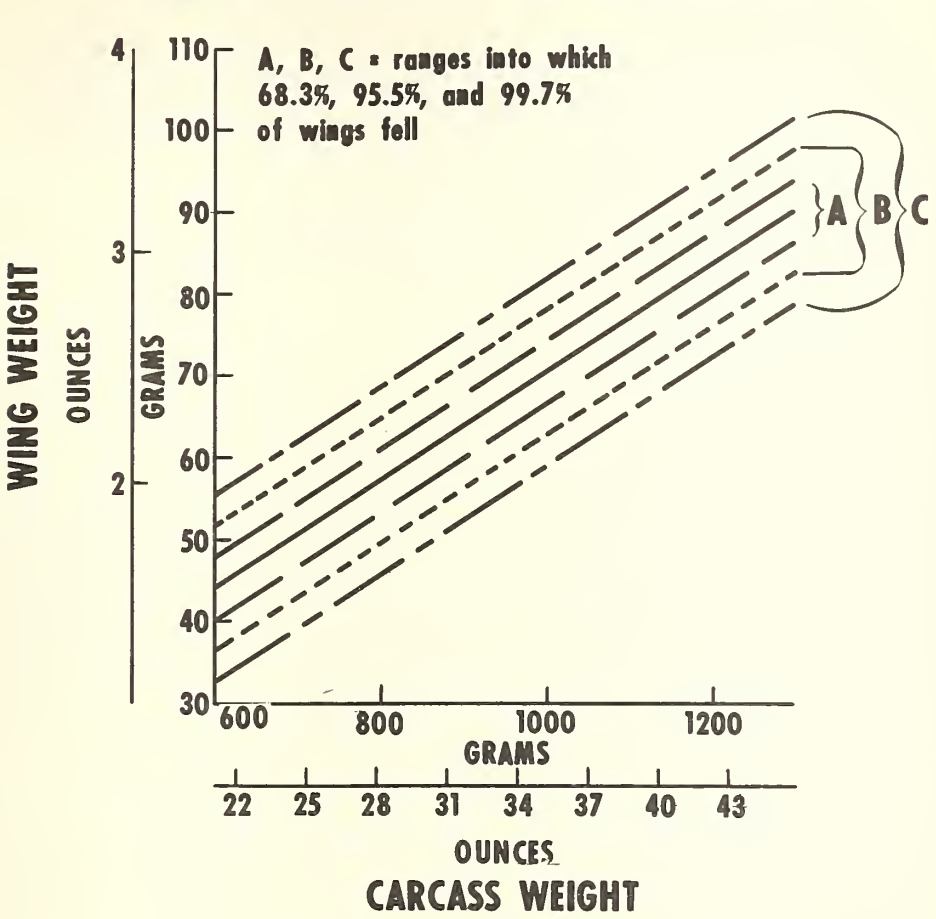
USE OF WEIGHT RELATIONSHIP INFORMATION 3/

To select a broiler carcass size that will yield drumsticks weighing between 2 and 3 ounces, refer to figure 4. Assume that, in this case, it is satisfactory to have about 95 percent of the drumsticks fall between 2 and 3 ounces. Enter the graph at the column marked "drumstick weight" at the 2-ounce

---

2/ In this study the pattern of weights of parts was rather uniformly distributed around the average. If the majority of carcasses in any commercial run fall into either the heavy or light end of a weight range, the same will probably hold true for the component parts.

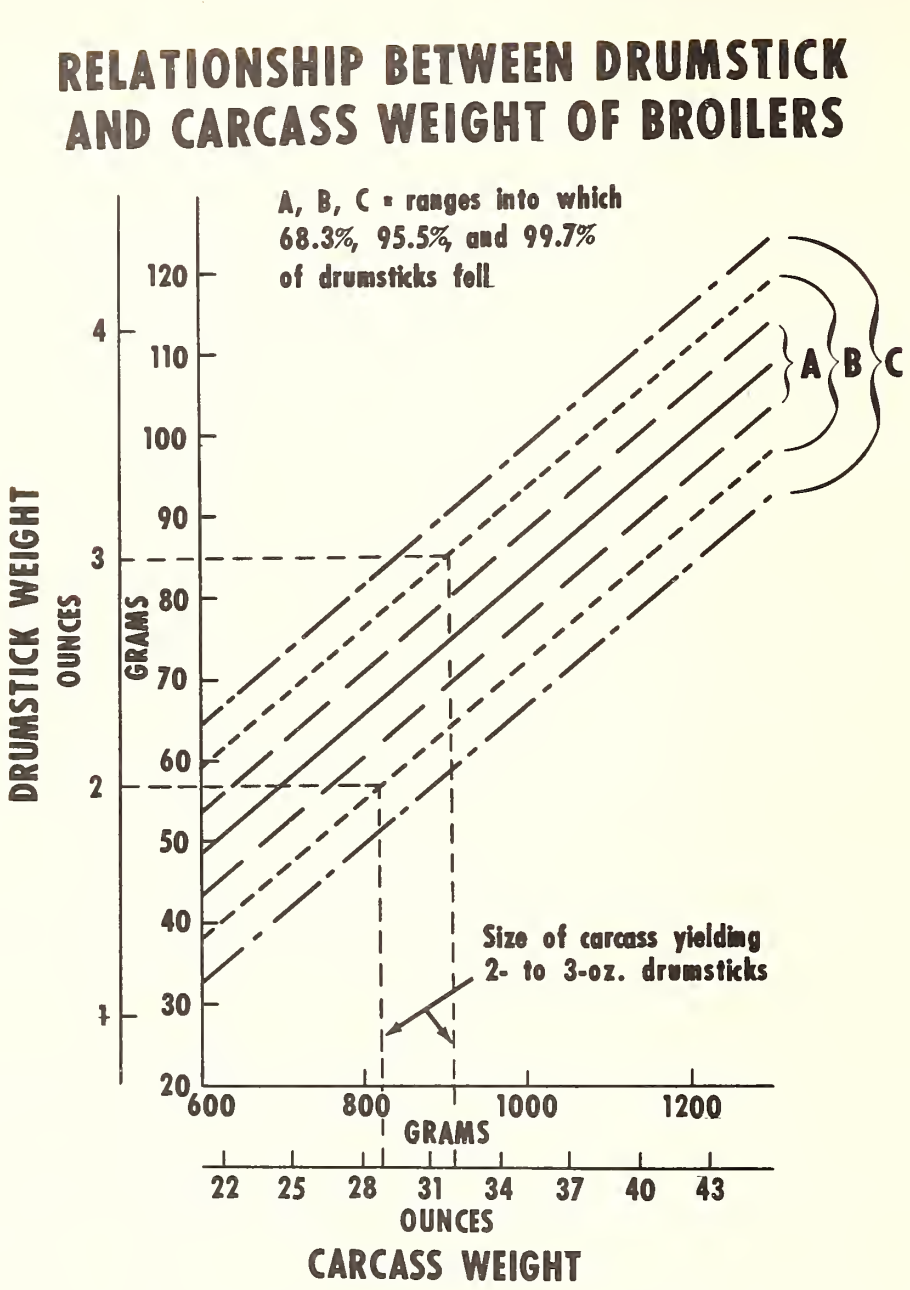
3/ It should be borne in mind that in large commercial runs involving parts from various flocks, the range in weight of parts may shift slightly from one flock to another, although the weights of the carcasses are identical.



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 426-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 3

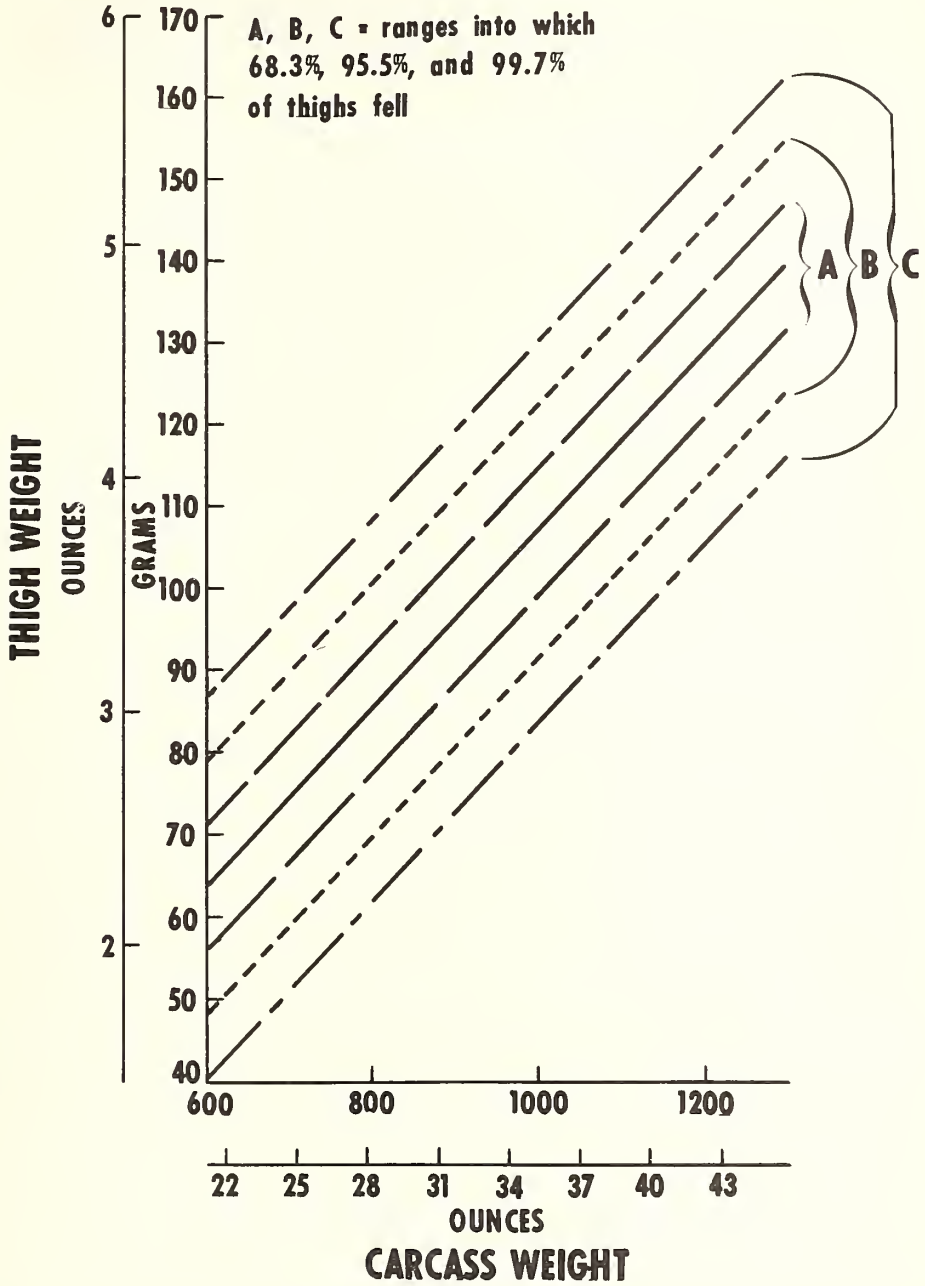
point, and from this point extend a horizontal line to the right until it intersects the lower of the two lines which are marked "B." From this intersection, extend a vertical line downward until it intersects the body weight scale. This carcass weight value is almost 29 ounces and is the lower carcass weight limit for providing the desired drumstick size. The upper limit is obtained by extending a horizontal line from the 3-ounce point on the drumstick scale, to the right until it intersects the upper line marked "B." A vertical line is extended downward from this point, and the body weight scale is intersected at about 32 ounces. The carcass weight range, therefore, that can be expected to provide drumsticks of 2 to 3 ounces is 29 to 32 ounces. In determining the desirability of using this size of carcass for obtaining the drumsticks, it may be desirable to consider the size of other parts yielded by this carcass size. Figure 8 can be used to determine the mean weight expected for other parts of a carcass of this size. The average carcass weight for the 29- to 32-ounce bird is 30.5 ounces. Figure 8 shows that, for a body weight of 30.5 ounces, the mean parts weights are: Wings 2.3 ounces, thigh 3.3 ounces, back 4.2 ounces, and breast 9.9 ounces.



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 427-63 (1) AGRICULTURAL MARKETING SERVICE

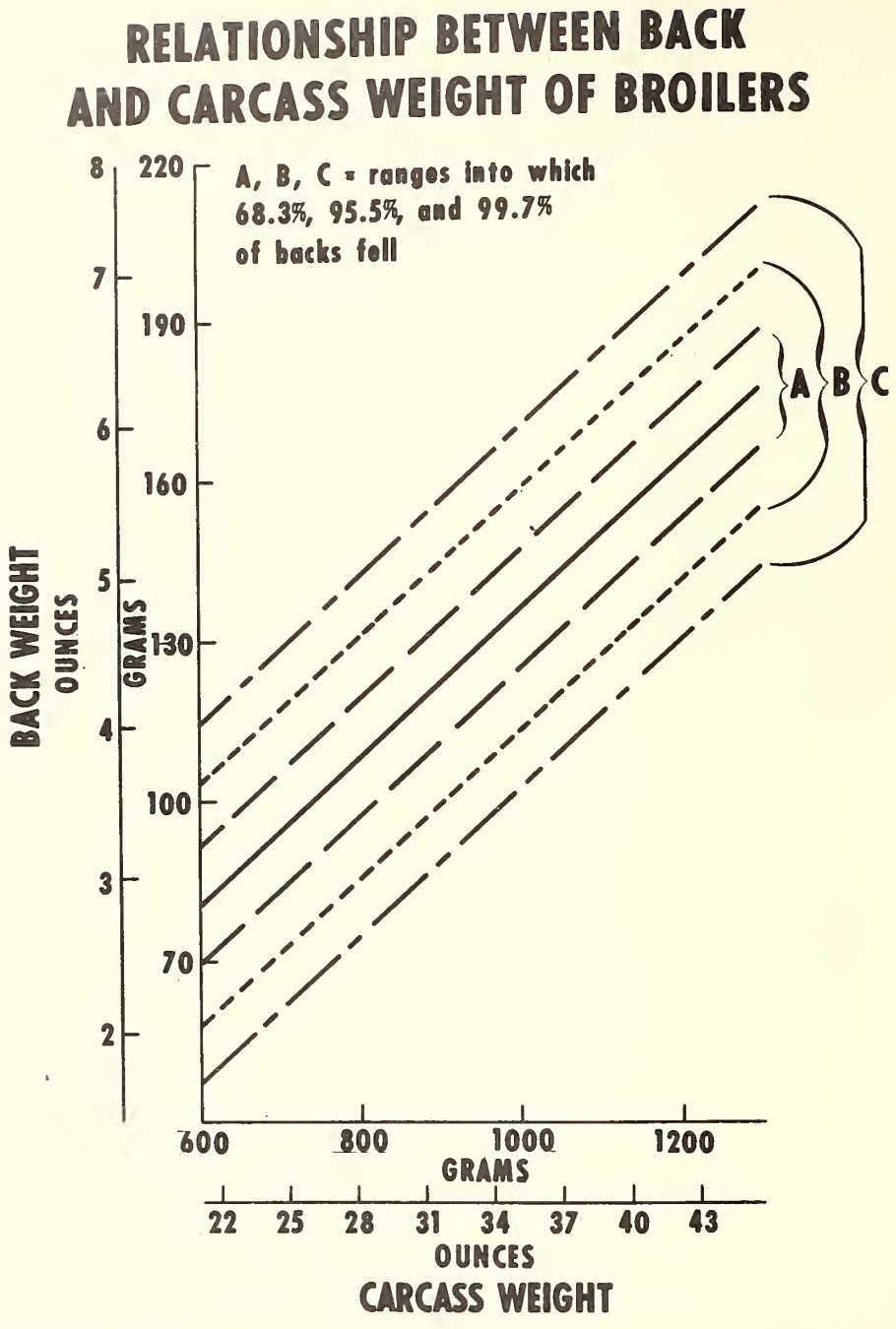
Figure 4

RELATIONSHIP BETWEEN THIGH AND CARCASS WEIGHT OF BROILERS



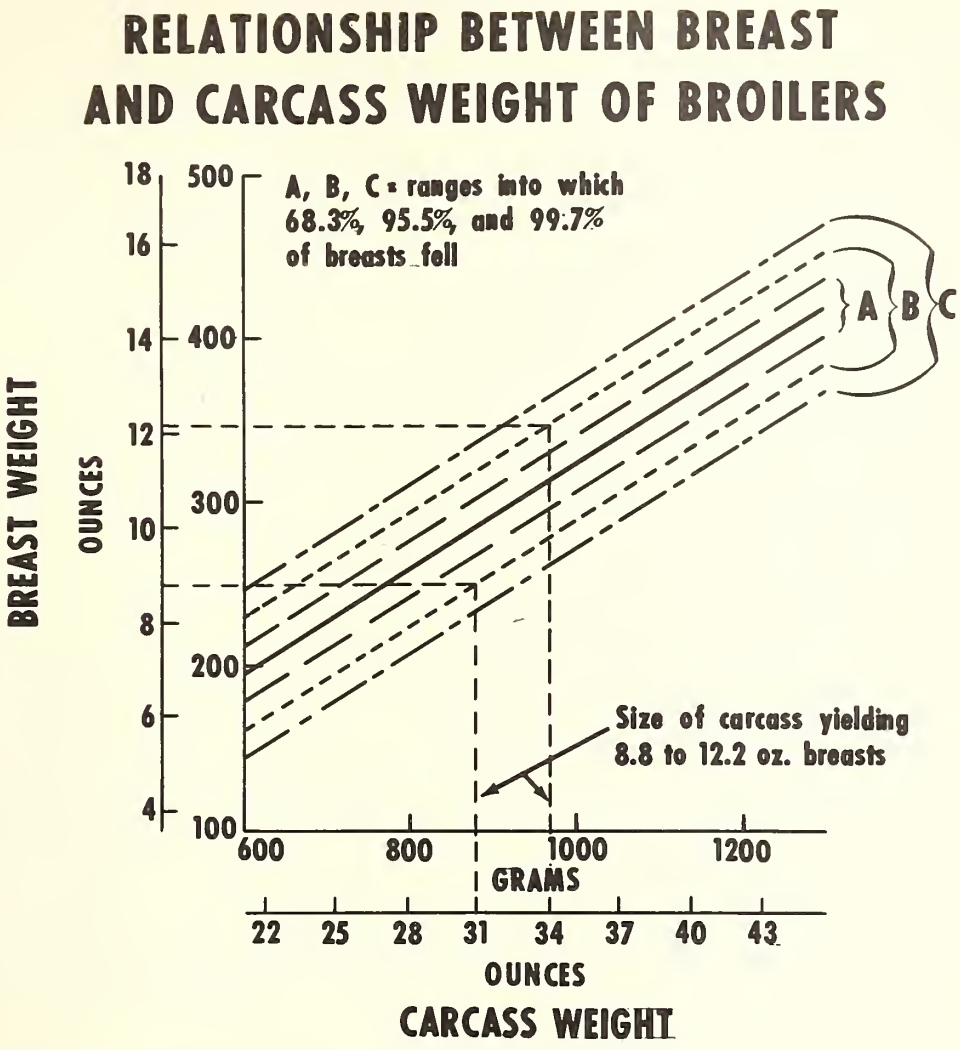
U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 428-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 5



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 429-63(1) AGRICULTURAL MARKETING SERVICE

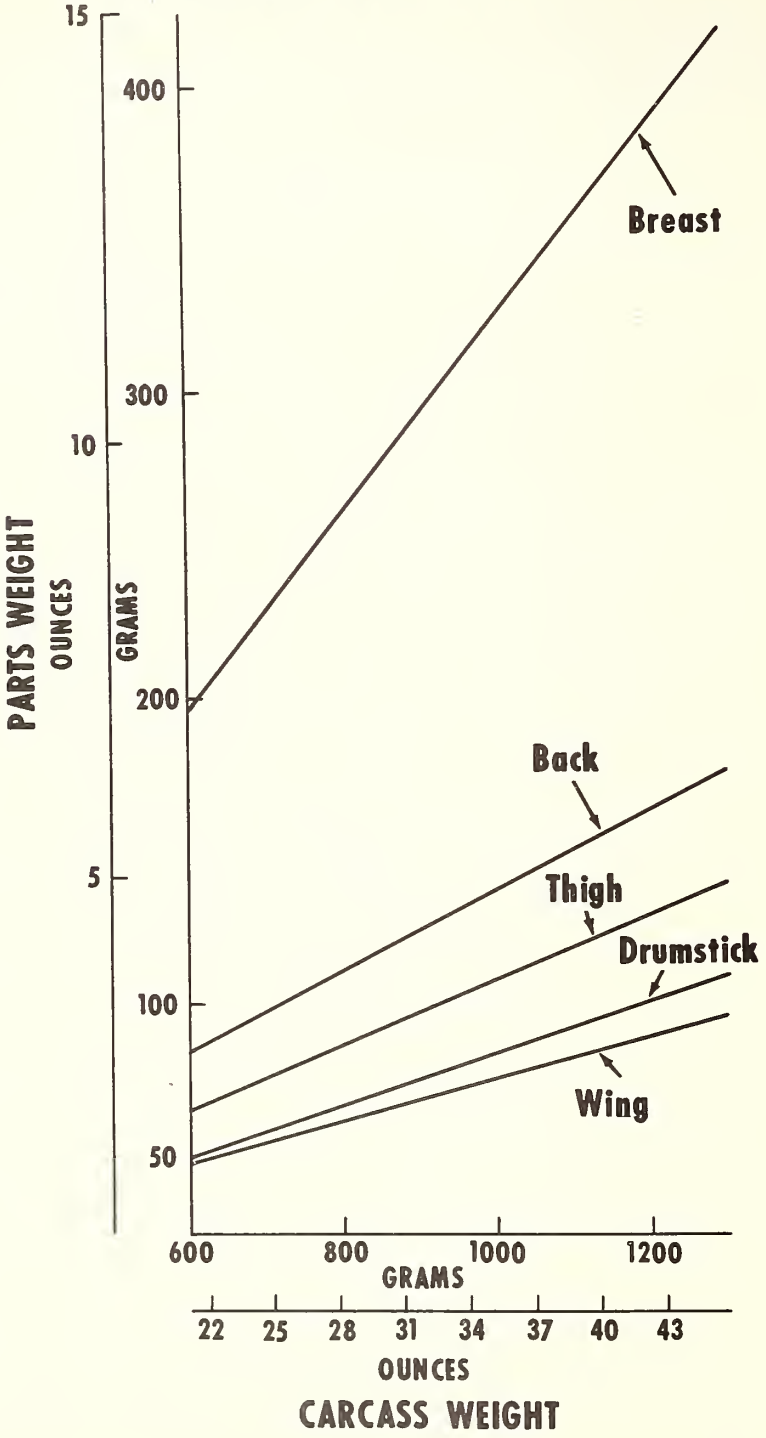
Figure 6



U. S. DEPARTMENT OF AGRICULTURE. NEG. AMS 430-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 7

RELATIONSHIP BETWEEN MEAN WEIGHT OF BROILER PARTS AND CARCASS



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 431-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 8

The weight range for parts from a particular size of carcass can be obtained by using one of the figures from 3 through 7. For example, to obtain the size of the breast from a 31- to 34-ounce broiler, enter figure 7 at the 31-ounce body weight and assume that the weight range for about 95 percent of the breasts is adequate. Extend a vertical line upward until it intersects the lower of the two lines marked "B." From this point, extend a horizontal line to the left until it intersects the breast weight scale. This point is 8.8 ounces. Next, extend a vertical line upward from the 34-ounce body weight until it intersects the upper line marked "B." From this point, extend a horizontal line to the left until it intersects the breast scale; this point is 12.2 ounces. Approximately 95 percent of the breasts from broilers weighing between 31 and 34 ounces will fall into the weight range of 8.8 to 12.2 ounces.

The percentage relationship between carcass weight and the weight for each part is as follows: Wings 14.15 percent, drumsticks 16.36, thighs 21.30, stripped backs 13.69, whole breasts 32.23, and weight loss due to evaporation and weepage (dripping) 2.27 percent. The fact that a single straight line best represents the relationship between mean part weight and body weight indicates that parts percentages remained approximately the same for all carcass sizes through the range measured.

RELATIONSHIP OF VOLUME OF PARTS TO CARCASS WEIGHT

The analysis of the relation between carcass weight and volume of parts indicated that, for all parts, a straight-line relationship existed between part volume and carcass weight. These relationships are illustrated in figures 9, 10, 11, 12, and 13, and are similar to those in the section on weights of parts. Values can be taken from these charts in the same way as from the weight charts. A detailed statistical description of the results is presented in the appendix (table 4, p. 29).

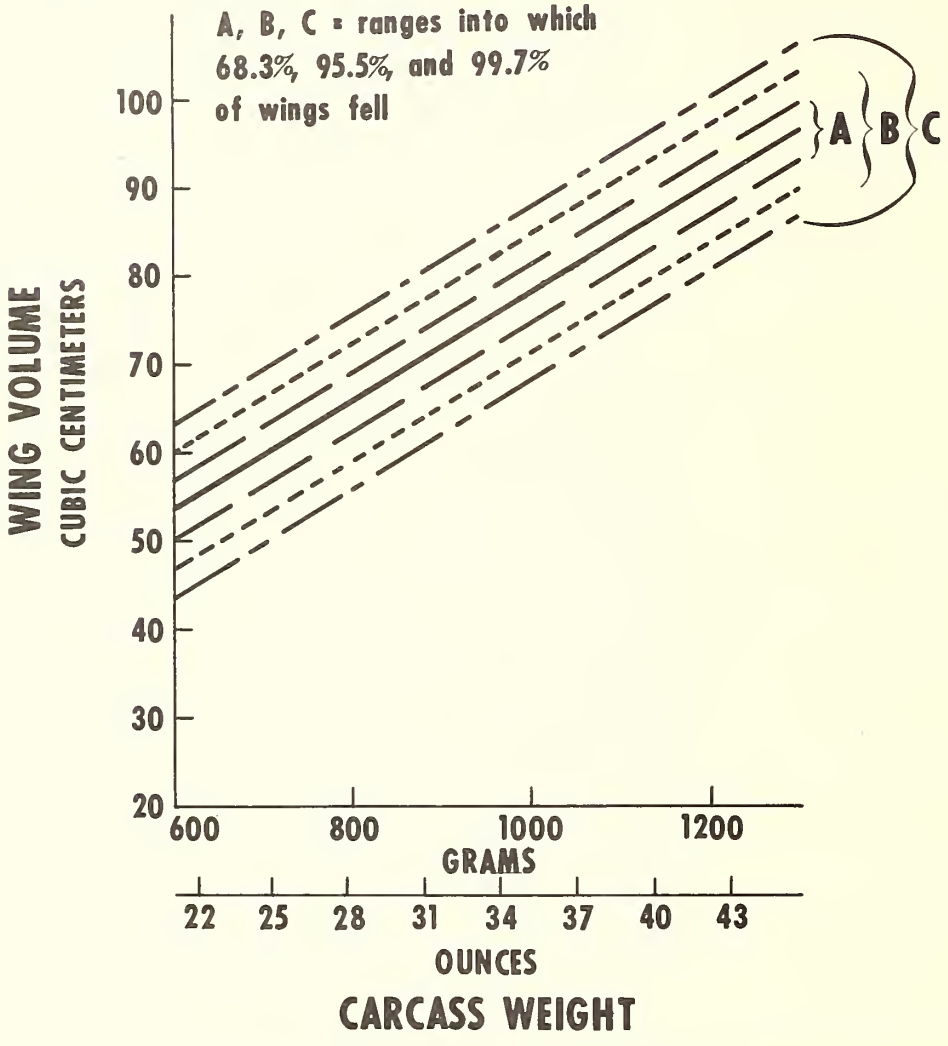
The average percentage relationship between carcass volume (without giblets or necks) and volume of each part is as follows: Wings 14.33 percent, drumsticks 17.47, thighs 20.91, backs 14.39, and breast 32.90.

The total average carcass volume can be determined by obtaining the average volume for each part for any particular size of carcass from figures 9 through 13, and totaling these volumes.

RELATIONSHIP OF DIMENSIONS OF PARTS TO CARCASS WEIGHT

As with weights and volumes of parts, the three dimensions measured for each part showed a definite straight-line relationship to the weight of the broiler carcass. Figures 14, 15, 16, 17, and 18 show the results of the analysis of these parts measurements. The results shown in these graphs are of the same type described for the relationships of parts weight to body weight, so that the values can be obtained from these figures in the way described for obtaining data on weights of parts. A detailed statistical description of the results is presented in the appendix (table 5, p. 30).

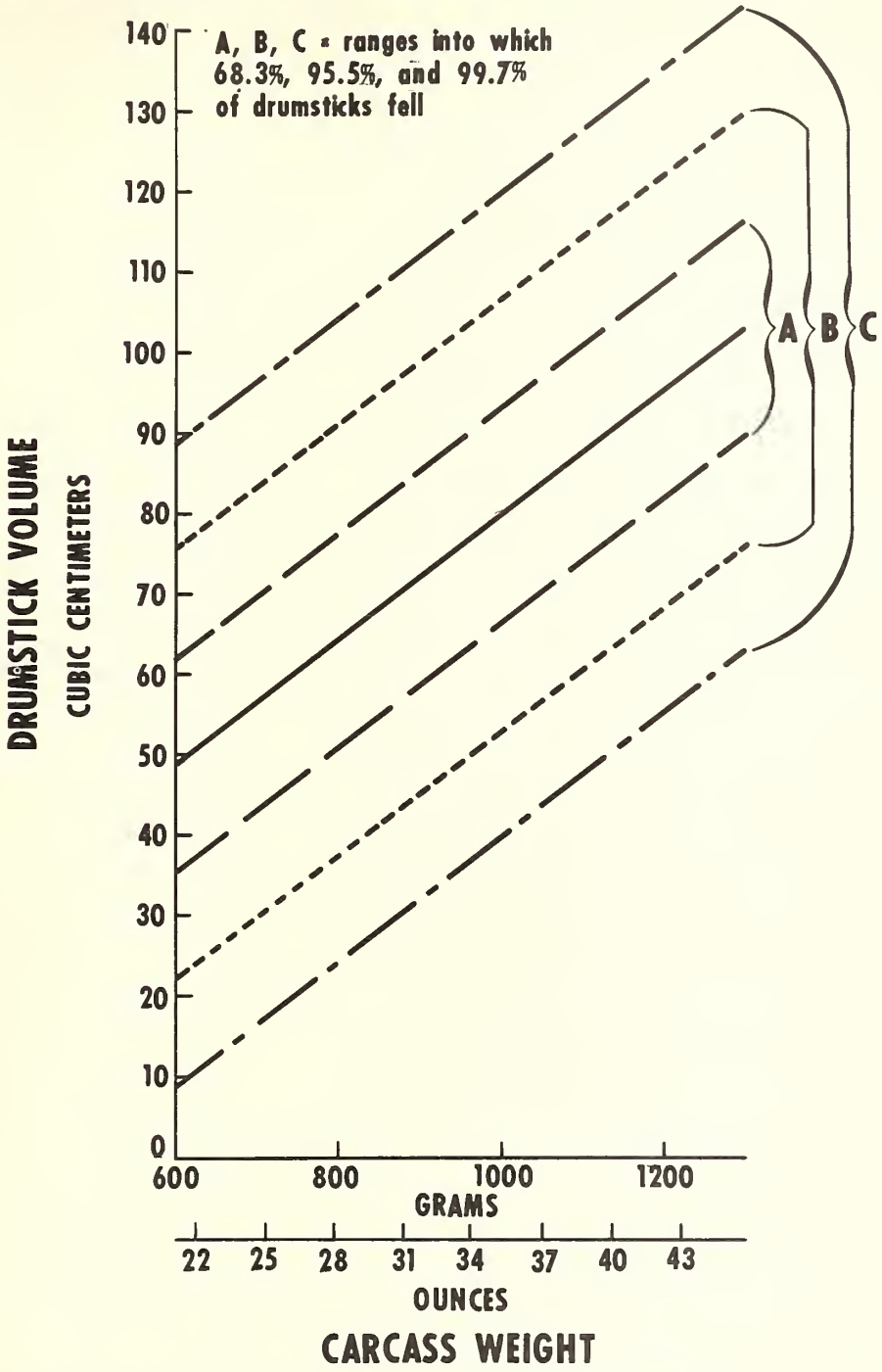
RELATIONSHIP BETWEEN WING VOLUME AND CARCASS WEIGHT OF BROILERS



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 432-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 9

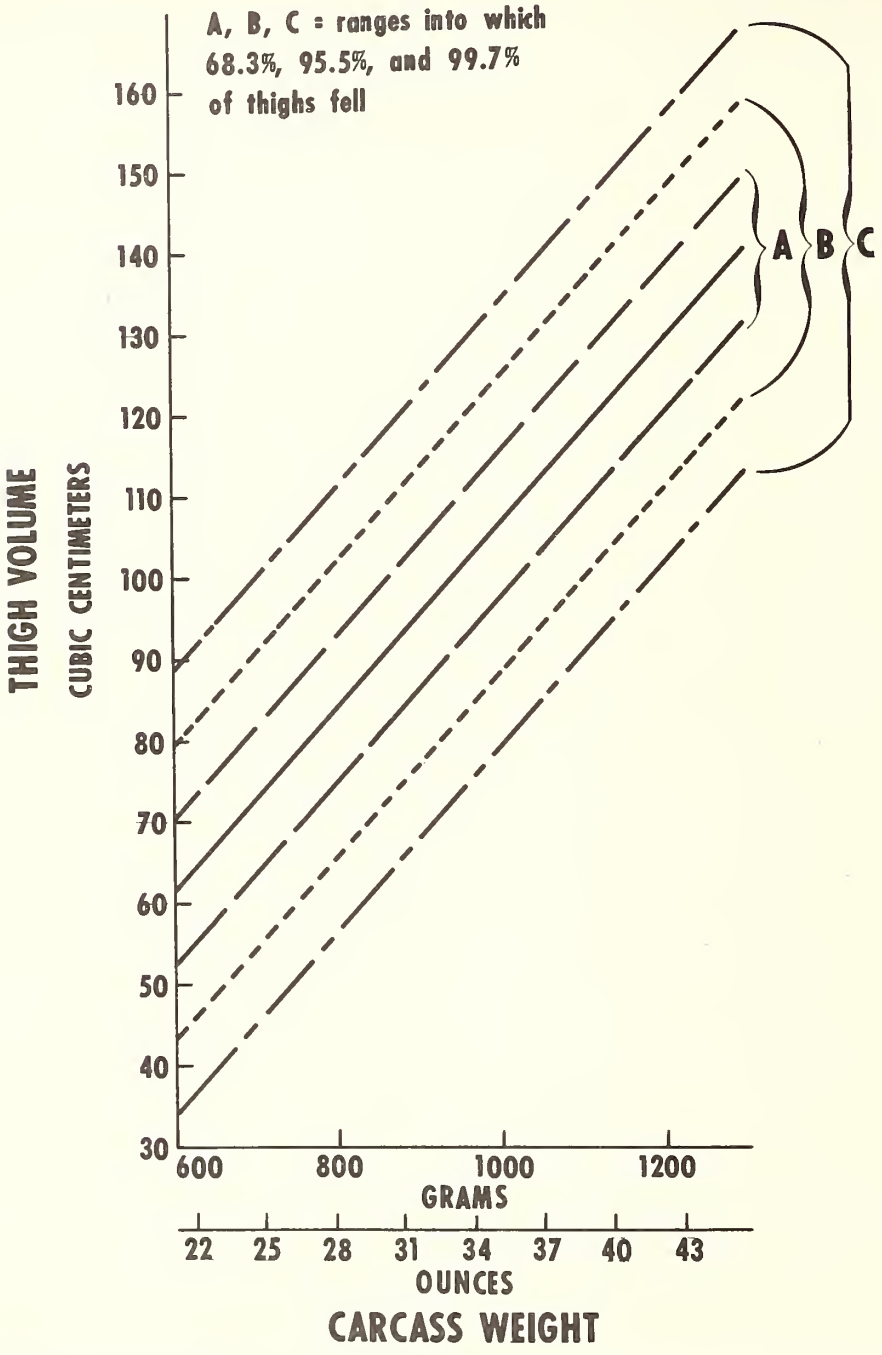
RELATIONSHIP BETWEEN DRUMSTICK VOLUME AND CARCASS WEIGHT OF BROILERS



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 433-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 10

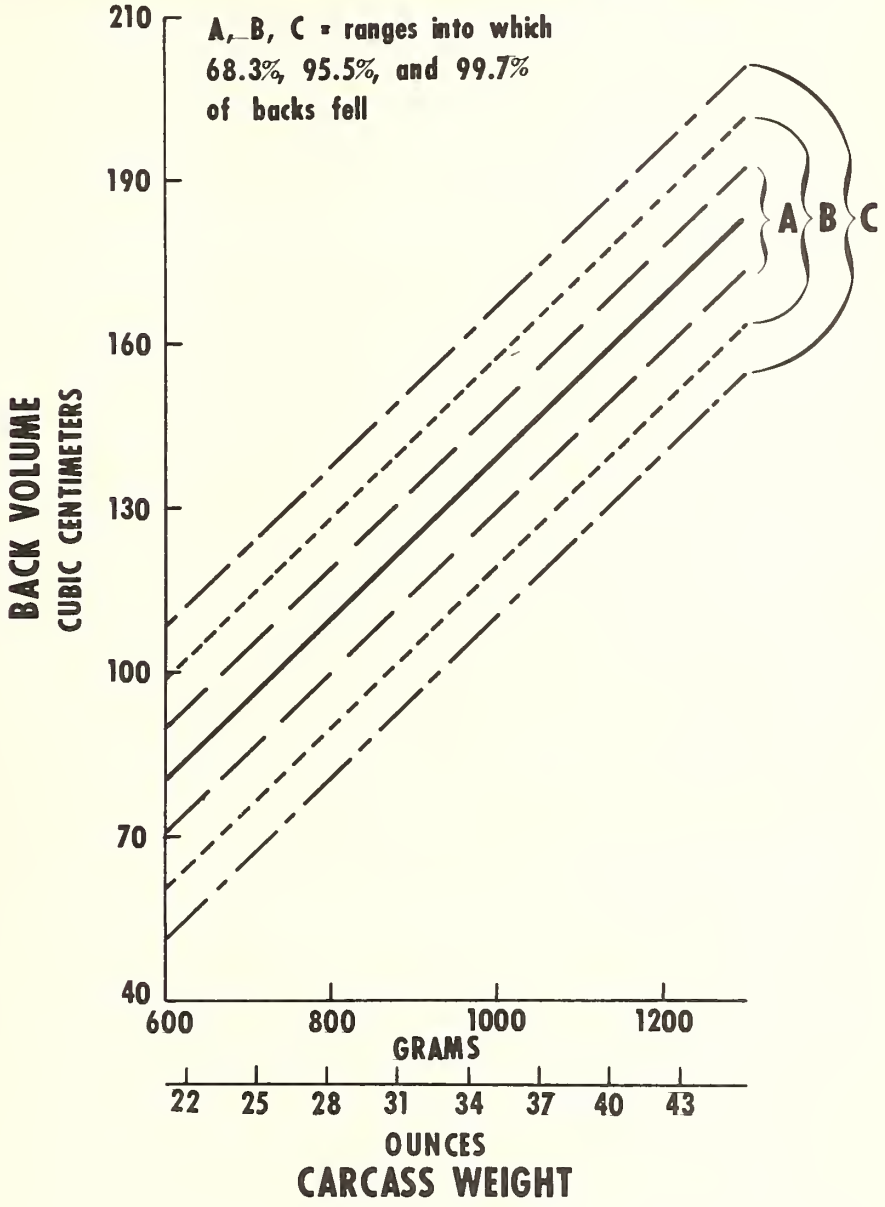
RELATIONSHIP BETWEEN THIGH VOLUME AND CARCASS WEIGHT OF BROILERS



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 434-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 11

RELATIONSHIP BETWEEN BACK VOLUME AND CARCASS WEIGHT OF BROILERS



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 435-63(1) AGRICULTURAL MARKETING SERVICE

Figure 12

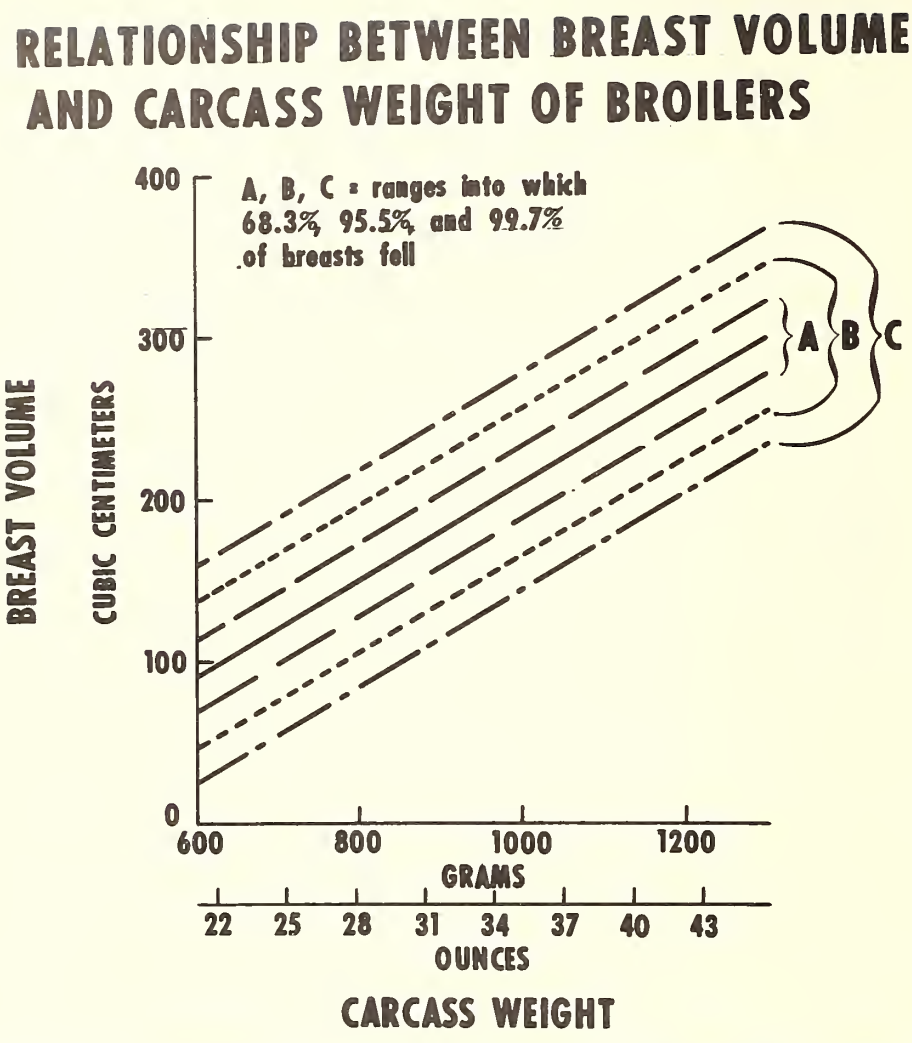
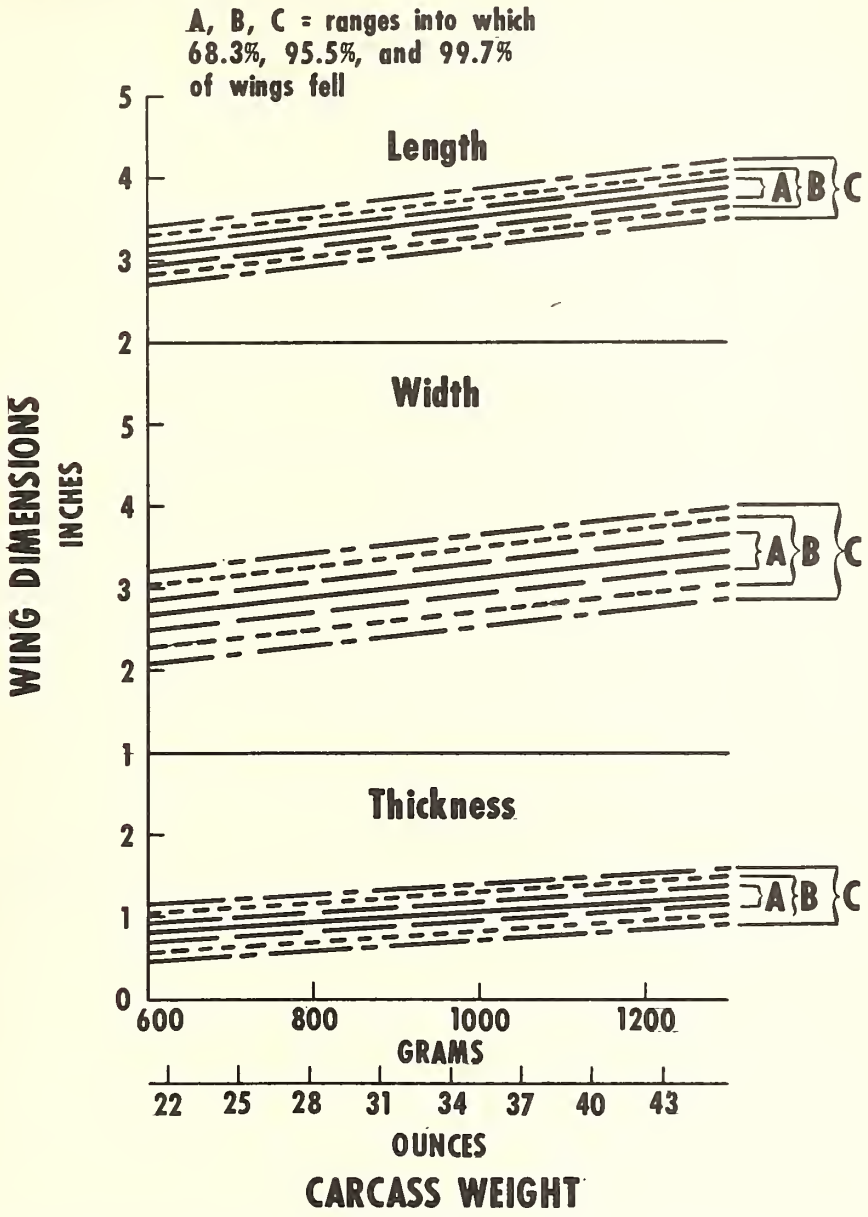

RELATIONSHIP BETWEEN BREAST VOLUME AND CARCASS WEIGHT OF BROILERS
A, B, C = ranges into which 68.3%, 95.5%, and 99.7% of breasts fell
A
B
C
BREAST VOLUME
CUBIC CENTIMETERS
400
300
200
100
0
600
800
1000
1200
GRAMS
22
25
28
31
34
37
40
43
OUNCES
CARCASS WEIGHT
U. S. DEPARTMENT OF AGRICULTURE
NEG. AMS 436-63 (1)
AGRICULTURAL MARKETING SERVICE

Figure 13

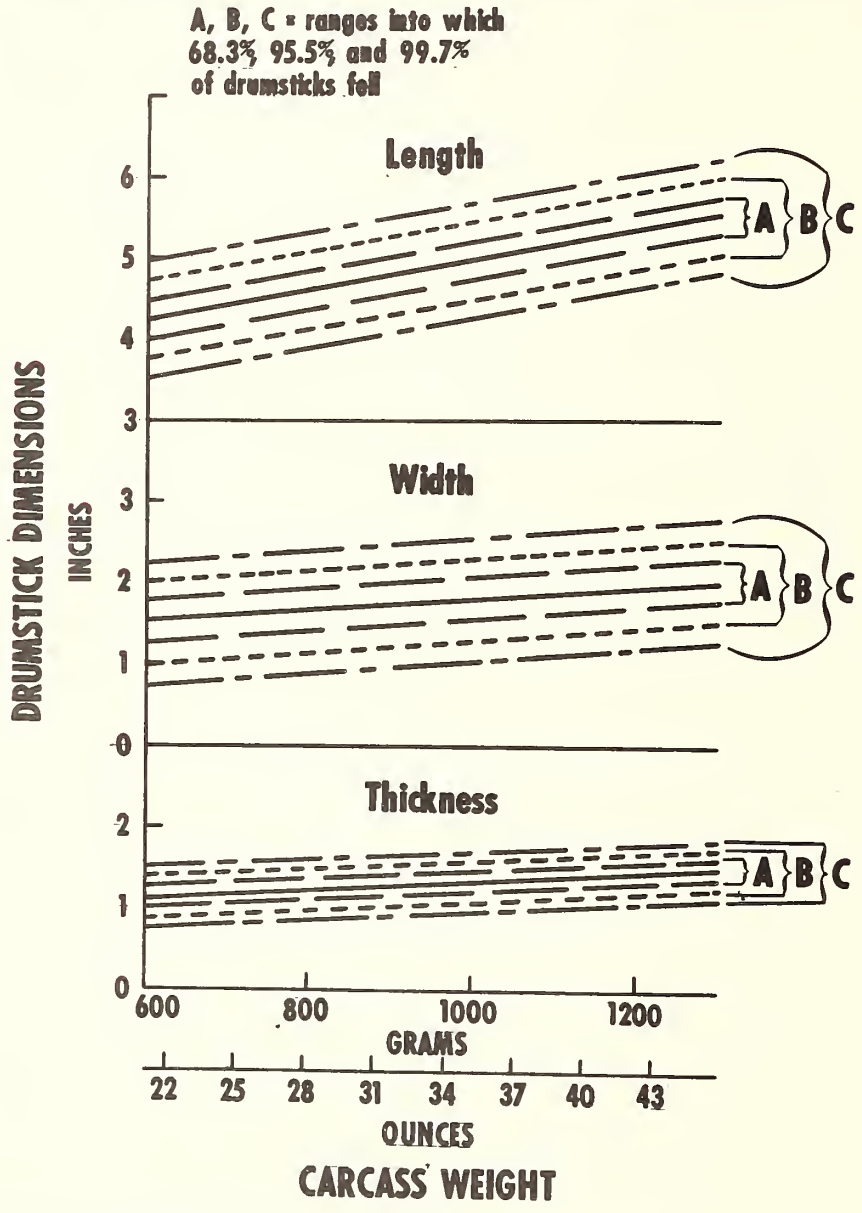
RELATIONSHIP BETWEEN WING DIMENSIONS AND CARCASS WEIGHT OF BROILERS



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 437-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 14

RELATIONSHIP BETWEEN DRUMSTICK DIMENSIONS AND CARCASS WEIGHT OF BROILERS

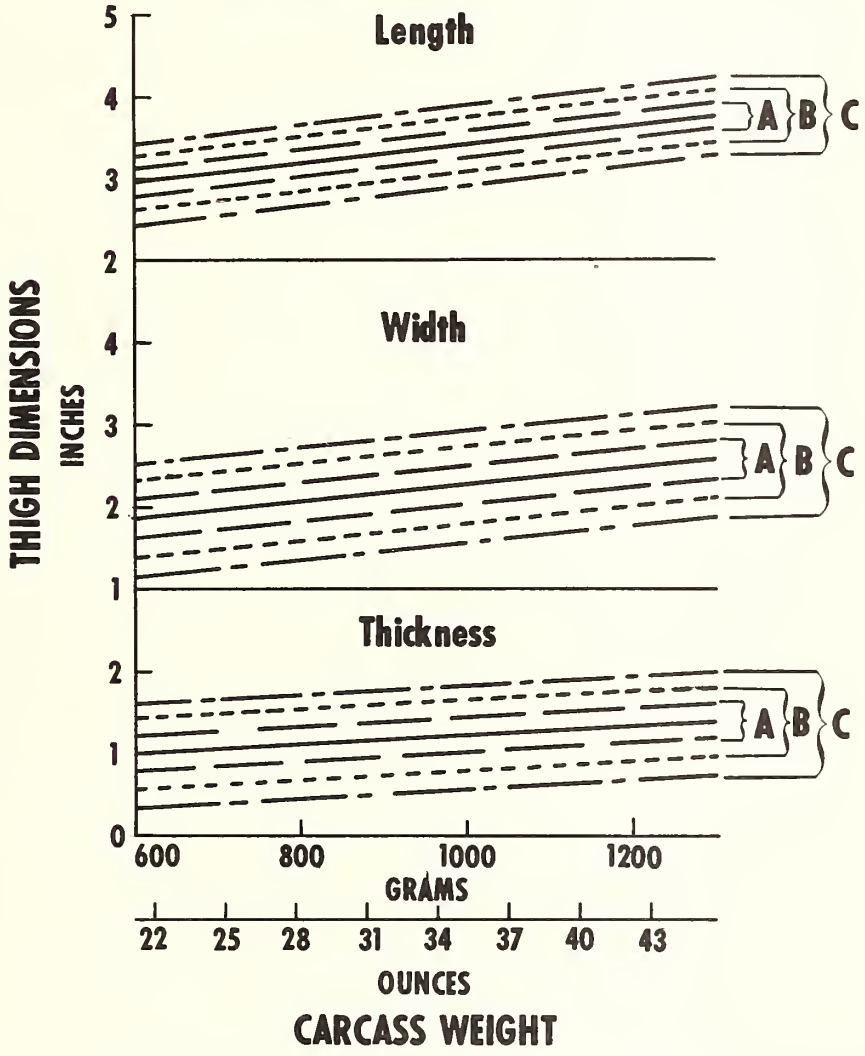


U. S. DEPARTMENT OF AGRICULTURE— NEG. AMS 438-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 15

RELATIONSHIP BETWEEN THIGH DIMENSIONS AND CARCASS WEIGHT OF BROILERS

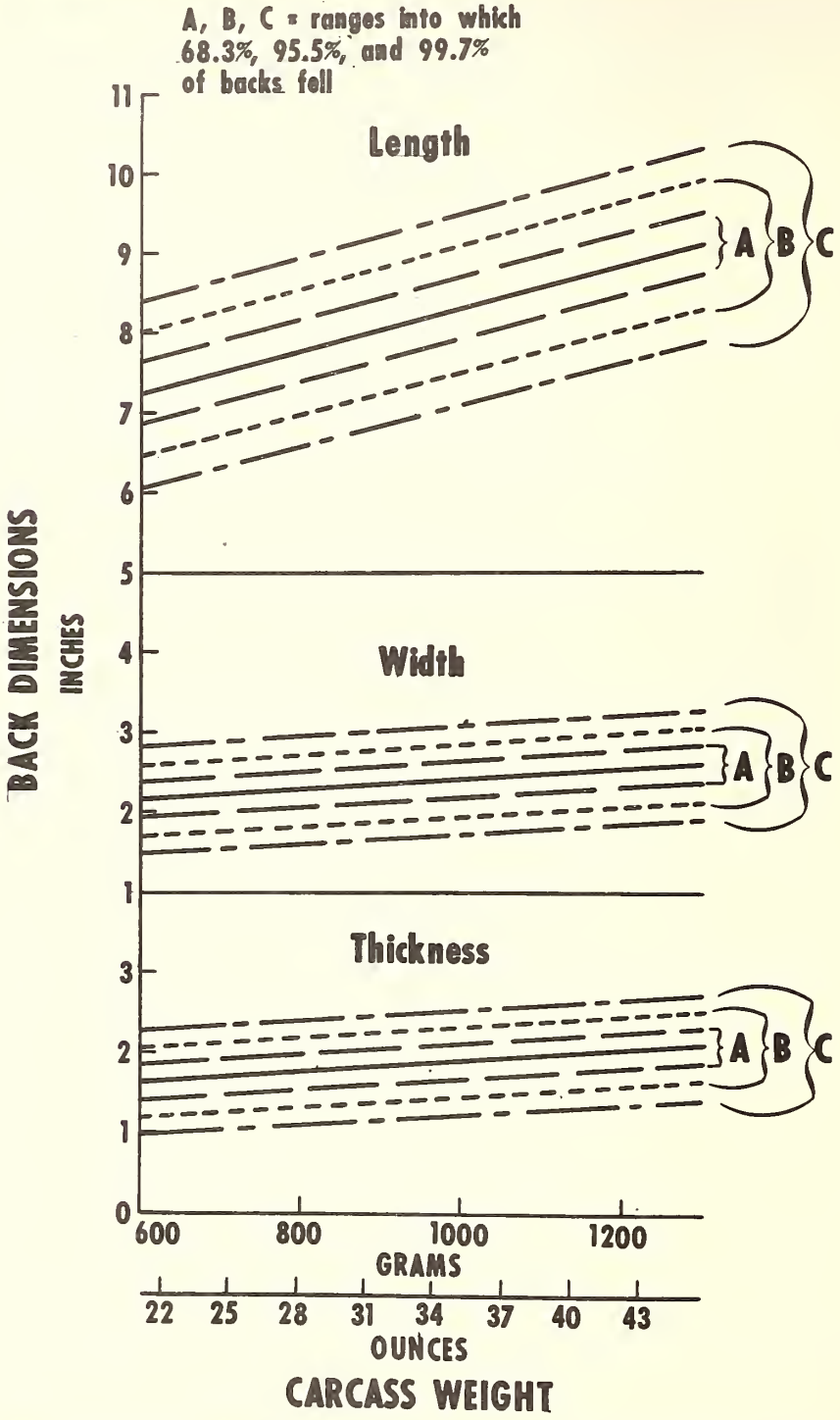
A, B, C = ranges into which 68.3%, 95.5% and 99.7% of thighs fell



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 439-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 16

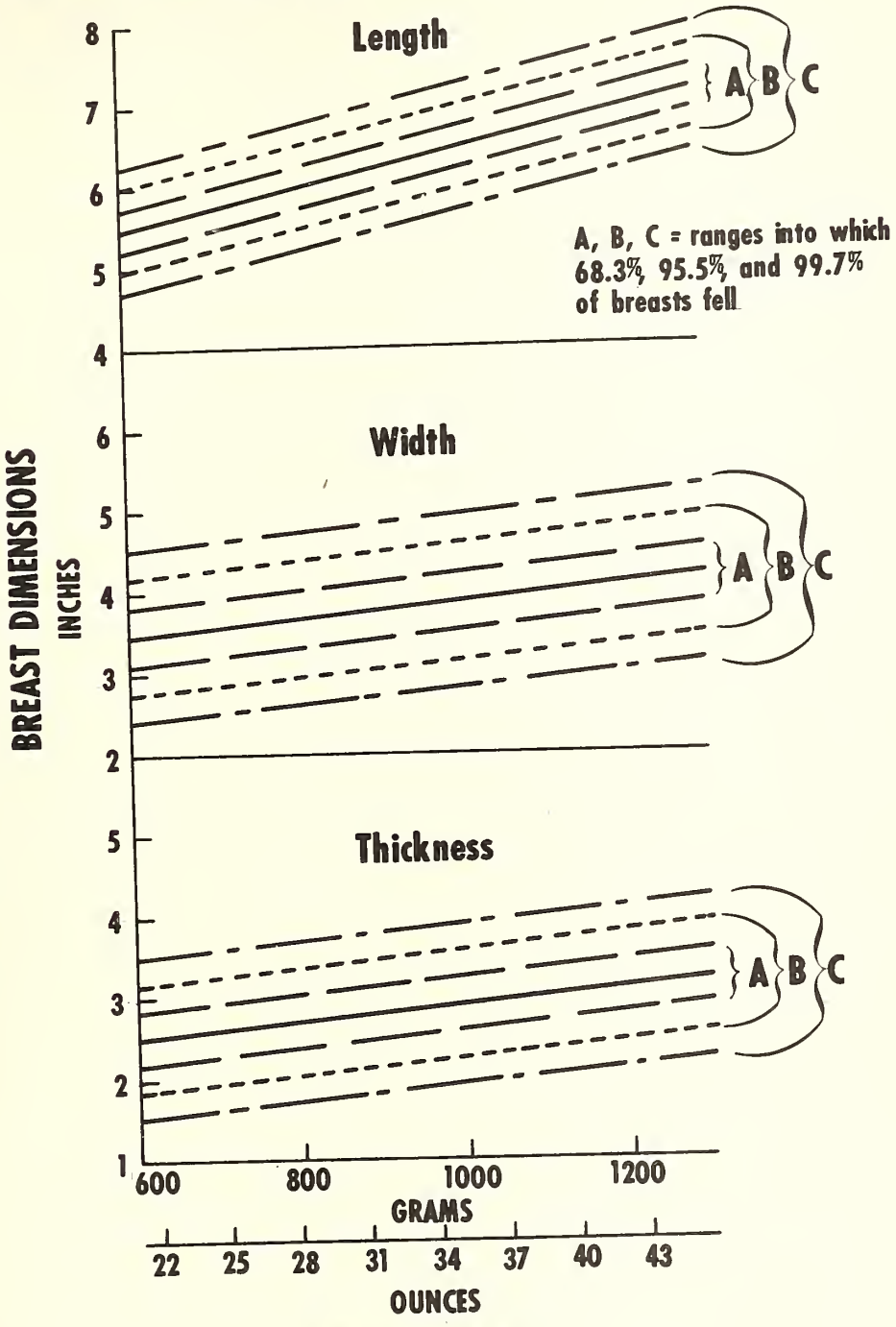
RELATIONSHIP BETWEEN BACK DIMENSIONS AND CARCASS WEIGHT OF BROILERS



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 440-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 17

RELATIONSHIP BETWEEN BREAST DIMENSIONS AND CARCASS WEIGHT OF BROILERS



U. S. DEPARTMENT OF AGRICULTURE NEG. AMS 441-63 (1) AGRICULTURAL MARKETING SERVICE

Figure 18

CONCLUSIONS AND APPLICATIONS

Weights

The results of this study are limited in application to situations where specified cuts are made in dismembering 1¼- to 3-pound broiler chickens. Similar determinations can be made for any type of cut or class of chickens, if linear regression methods are used. These methods are set forth in almost every statistics text, and are relatively easy to use.

Frequently, certain parts can be selected to fit very close tolerances for use in portion-control packages, by presizing the carcass rather than by sizing individual parts. For example, about 95 percent of the wings from 32- to 36-ounce carcasses (table 1) vary in weight by 0.9 ounce, and the drumsticks by 1.0 ounce. Figure 4 indicates, however, that approximately two-thirds of the drumsticks from carcasses of this size vary only about 0.7 ounce. Thighs from carcasses of 32 to 36 ounces show a variation of 1.5 ounces. Closer sizing of the carcass would result in a slight reduction of this weight range. The larger variations between individual breasts, backs, and thighs, as seen in table 1 and in figures 5, 6, and 7, would make it difficult to obtain parts having small variations by presizing carcasses. Tables similar to table 1 can be drawn up for the various combinations of sizes of parts and of carcasses commonly processed, as a guide in day-to-day operations.

Table 1.--Weight range and variation of broiler parts from 32- to 36-ounce carcasses 1/

Part	Weight range for 95% of the parts	Weight variation for 95% of the parts	Average part weight
	Ounces	Ounces	Ounces
Wing	2.0 - 2.9	.9	2.5
Drumstick	2.3 - 3.3	1.0	2.8
Thigh	2.9 - 4.4	1.5	3.7
Back	3.7 - 5.7	2.0	4.7
Breast	9.3 - 12.8	3.5	11.1

1/ Calculated from values developed in figures 3, 4, 5, 6, and 7.

One of the big problems in packaging parts to an exact weight is the need of interchanging the last part several times before the proper weight is found. This problem is more difficult with parts from some lots of carcasses than from others. Table 2 was developed to show how selection of carcass size can influence packaged combinations. From the data in table 2, it can be seen that certain carcass sizes are better suited for ease in obtaining packages of particular net weights than are other carcass sizes. This table also shows

the size of carcass required for packaging a given number of pieces into a package of a given weight. For example, to package 13 drumsticks into a 2-pound package, 24- to 28-ounce carcasses do not yield large enough drumsticks, and those from the 32- to 36-ounce size are a little large. On the other hand, the 28-to-32 weight range yields drumsticks whose mean weight, when multiplied by 13, is exactly 2 pounds. Other combinations which would produce a 2-pound package are 9 drumsticks from the 40- to 44-ounce carcass or 15 drumsticks from the 24- to 28-ounce carcass.

Table 2.--Number of pieces and average weight in pounds of drumsticks from carcasses of various sizes 1/

No. of drumsticks	Weight of drumstick groups, by carcass weight ranges				
	24 to 28 oz.	28 to 32 oz.	32 to 36 oz.	36 to 40 oz.	40 to 44 oz.
	Pounds	Pounds	Pounds	Pounds	Pounds
4	---	---	---	---	.87
5	---	---	.87	2/.98	1.09
6	---	.92	2/1.05	1.18	1.30
7	.93	1.08	1.22	1.37	1.52
8	2/1.05	1.23	1.40	1.56	1.74
9	1.19	1.38	1.57	1.76	2/1.96
10	1.32	1.54	1.75	1.96	2.17
11	1.46	1.69	1.92	2.15	2.39
12	1.59	1.84	2.10	2.35	2.61
13	1.72	2/2.00	2.27	2.54	---
14	1.85	2.15	2.45	---	---
15	1.99	2.30	2.62	---	---
16	2.12	2.46	---	---	---
17	---	2.61	---	---	---

1/ Data taken from figure 4.
2/ Underscore indicates best combinations for 1-, 2-, or 2-1/2-pound containers.

Sorting of carcasses into size groups in advance can limit the variation between individual parts. When the proper carcass size is chosen, some parts can be sized for portion-controlled packages. In the results presented here, carcass sizing can be used to limit variation in drumsticks, thighs, and wings. Carcass sizing can also be used to provide easily made combinations for exact-weight packages. Presizing of carcasses for exact weighing of a particular part, however, does not mean that other parts from these carcasses will have a mean weight which makes easy combinations.

Parts were found to be approximately the same percentages of carcass weights for all carcass sizes.

The methods used for determining the most desirable carcass size for a particular operation can be carried back to the purchase of live birds. The buyer can attempt to procure live birds that yield the most desirable part weights.

Volumes and Dimensions

The volume and the three dimensions found for each part can be predicted within practical limits from the weight of the carcass. The amount of variation in volumes followed very closely the variations in weights except for drumsticks, where volume variation was much greater. The length of a part can be predicted much more accurately from body weight than can width or thickness of the part.

The volumes and dimensions presented previously can be used to determine optimum package sizes for parts from various sizes of carcasses, and to design conveyors, scales, and other equipment used to handle parts. Optimum package size is important from the standpoint of space required on the market shelf, space for shipping, and warehouse and freezing space; and it also affects the rate at which the package freezes.

APPENDIX

Cuts Made on Chicken Carcasses 4/

Wings.--Wings were removed by a cut beginning at the posterior side of the proximal end of the humerus and extending downward into the shoulder joint and coming out at the anterior side of the proximal end of the humerus. This cut was executed in such a way as to leave all of the breast meat on the breast and all of the wing meat on the wing.

Breast.--Breasts were removed by a series of three cuts. First, a cut was made through the abdominal skin beginning posterior to the distal end of the sternum and then extending dorsoanteriorally to the back at a point just posterior to the seventh (or last) rib. A cut was then made on each side of the back beginning at the position posterior to the seventh rib and extending anteriorally until the breast with ribs (sternal and vertebral) and scapula was completely severed from the back.

4/ The cuts on chicken carcasses were made with the birds hanging from shackles, suspended by the distal end of the drumstick.

Legs.--Legs were removed at the hip joint by a cut beginning at the posterior junction of the thigh muscles with the pelvic girdle and extending anteriorally to the hip joint, then downward to disjoint the femur. The leg was then pulled and the remaining loin or "oyster" muscle was pulled off with the thigh.

Back.--That portion of the carcass remaining after removal of wings, breast, and legs described above.

Separation of thigh and drumstick.--The drumstick was separated from the thigh by a cut straight through the joint formed by the femur, fibula, and tibiotarsus, the cut beginning on the posterior and ending on the anterior side.

Measurements Made on Chicken Parts

Wing.--Wings were folded into a triangular shape and held by forcing the wing tip over the dorsal side of the humerus. Length was measured as a straight line from the proximal to the distal end of the radius and ulna bones. Width was measured as a straight line from the middle of the dorsal side of the radius and ulna to the distal end of the wing tip. Depth was measured as the greatest distance (straight line) perpendicular to the length and width.

Drumsticks.--Length was measured as a straight line from the proximal to the distal ends of the tibia. Width was measured as the greatest distance from the anterior to the posterior side at right angles to the length. Depth was measured as the greatest depth perpendicular to the length and width.

Thigh.--Length was measured from the proximal to the distal end of the femur. Width was measured as the greatest distance at right angles to the length from the anterior to the posterior side at the proximal end of the femur. Depth was the greatest distance perpendicular to the length and width.

Breast.--Breast length was the distance from the distal end of the keel to the shoulder joint (juncture of scapula, clavicle, carocoid, and humerus bones). Width was measured as a straight line beginning at the distal tip of the scapula and extending across the part at right angles to the length. The depth was measured as the greatest distance perpendicular to the length and width.

Back.--Back length was a straight line from the posterior end of the pygostyle to the anterior tip of the neck vertebrae. Width was the greatest straight line at right angles to the length, measured across the pubic bones. Depth was the greatest distance perpendicular to the length and width.

Table 3.--Regression analysis of body weight vs. parts weights 1/

Part	Mean part weight	Mean body weight	Number of parts	Correlation coefficient	Regression equation 2/	Standard error of estimate
	Grams	Grams	Number			Grams
Wing	63.52	898.58	432	.98**	Y = 4.22 + .066X	3.74
Drumstick	73.58	898.58	432	.97**	Y = -2.61 + .085X	5.13
Thigh	95.71	898.58	432	.97**	Y = -1.96 + .109X	7.73
Back	123.06	898.58	216	.95**	Y = 1.38 + .135X	11.25
Breast	289.68	898.58	216	.98**	Y = 4.50 + .317	17.38

1/ Body weight was used as the independent variable.
2/ X and Y in grams.
** Denotes significant regression at the 1% level of probability.

Table 4.--Regression analysis of body weight vs. parts volumes 1/

Part	Mean part volume	Mean body weight	Parts examined	Correlation coefficient	Regression equation 2/	Standard error of estimate
	Cubic Centimeter	Grams	Number			
Wing	60.39	881.98	106	.97**	Y = 6.68 + .061X	3.52
Drumstick	70.74	881.98	106	.83**	Y = 2.48 + .077X	13.42
Thigh	92.29	881.98	106	.95**	Y = -6.31 + .112X	9.50
Back	121.20	881.98	53	.97**	Y = -7.46 + .146X	9.40
Breast	274.28	881.98	53	.96**	Y = 18.30 + .29X	21.27

1/ Body weight was used as the independent variable.
2/ X in grams, Y in cubic centimeters.
** Denotes significant regression at the 1% level of probability.

Table 5.--Regression analysis of body weight vs. parts dimensions 1/

Part	Dimension	Mean part dimension	Mean body weight	Number of parts	Correlation coefficient	Regression equation 2/	Standard error of estimate
		Inches	Grams				
Wing	length	3.38	895.70	186	.95**	Y = 2.31 - .0012X	.11
	width	2.97	895.70	186	.80**	Y = 1.99 - .0011X	.21
	thickness	1.06	895.70	186	.75**	Y = 0.71 - .0004X	.10
Drumstick	length	4.79	895.70	186	.92**	Y = 3.18 - .0018X	.21
	width	1.76	895.70	186	.59**	Y = 1.14 - .0007X	.26
	thickness	1.27	895.70	186	.80**	Y = 0.74 - .0006X	.11
Thigh	length	3.30	895.70	186	.87**	Y = 2.32 - .0011X	.14
	width	2.17	895.70	186	.60**	Y = 1.28 - .0010X	.23
	thickness	1.16	895.70	186	.62**	Y = 0.63 - .0006X	.20
Back	length	8.04	895.70	93	.87**	Y = 5.62 - .0027X	.40
	width	2.35	895.70	93	.55**	Y = 1.82 - .0006X	.23
	thickness	1.78	895.70	93	.57**	Y = 1.26 - .0006X	.22
Breast	length	6.18	895.70	93	.93**	Y = 4.01 - .0024X	.25
	width	3.78	895.70	93	.62**	Y = 2.86 - .0010X	.34
	thickness	2.84	895.70	93	.64**	Y = 1.90 - .0010X	.33

1/ Body weight was used as the independent variable.
2/ X in grams, Y in inches.
** Denotes significance at the 1% level of probability.